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(54) Incorporating electro-magnetic aerials into self-adhesive labels

(57) Lengths of metal thread (10) or other suitable material to form an electro-magnetic aerial are incorporated into an initial web (1) comprising a strip of self-adhesive label material (2) on a backing strip (3). The method comprises de-laminating and re-laminating the initial web (1) while winding the web from one reel to another, printing the labels on the label material strip (2) prior to de-lamination of the web, inserting cut lengths of the aerial forming material (10) between the separated strips (2 and 3) of the de-laminated web so that each length of material is sandwiched between the backing strip (3) and the adhesive face (2a) of the label material strip (2) when the web is re-laminated, and cutting the label material strip (2) of the re-laminated web to create a succession of labels (13) on the backing strip (3). The printing of the labels and the insertion of the lengths of aerial material are synchronized with the cutting of the label material strip so that each length of aerial material (10) lies wholly within the boundary of a printed label (13).

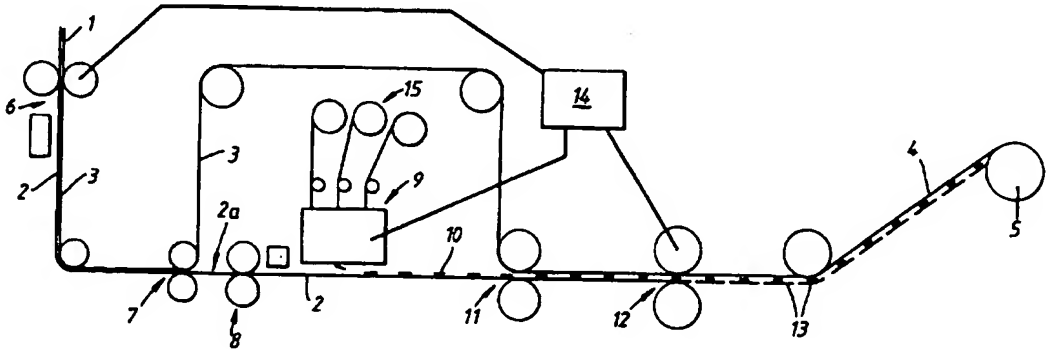

Fig.1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

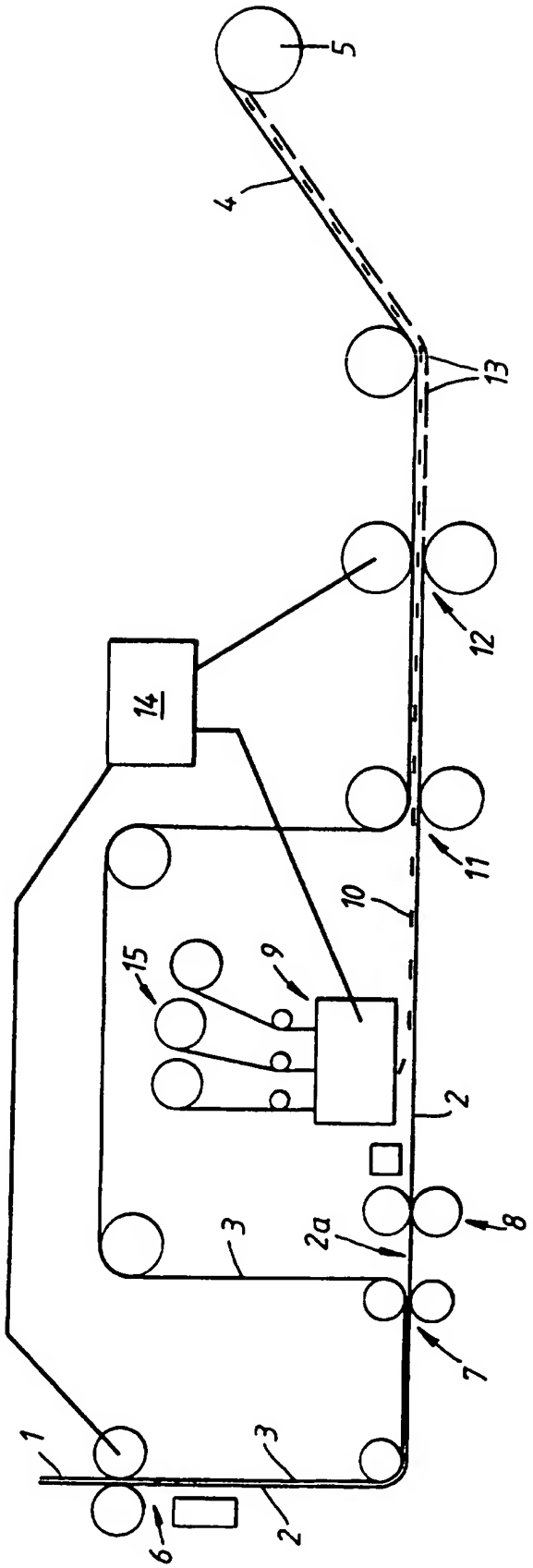

Fig.1

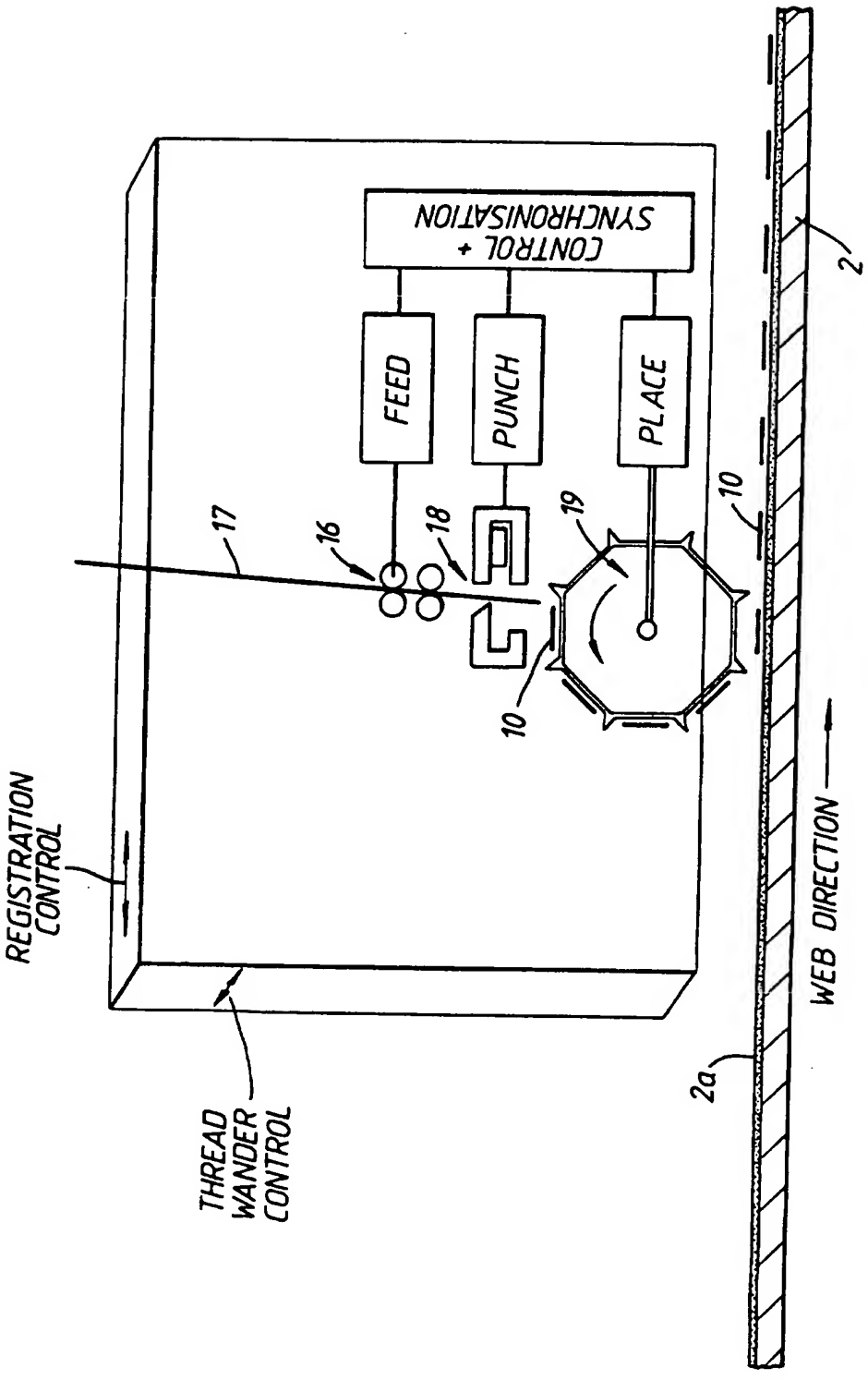
CONTROL + SYNCHRONISATION
FEED
PUNCH
PLACE
17
16
18
19
10
10
2
2a
REGISTRATION CONTROL
THREAD WANDER CONTROL
WEB DIRECTION

Fig.2

METHOD OF INCORPORATING ELECTRO-MAGNETIC AERIALS INTO SELF-ADHESIVE LABELS

One method which is commonly used to protect merchandise against theft is an electro-magnetic system in which electro-magnetic aerials in the form of metal strips or threads, usually of an alloy, are suitably attached to individual items of the merchandise and are operative to cause a detector to emit an alarm if any of the items is carried into a detection zone, usually at the shop exit, without its aerial first having been removed or deactivated.

Various ways of attaching the aerials to the merchandise have been used, and a particularly convenient method is to incorporate the metal strip or thread into a self-adhesive label. Self-adhesive labels are commonly produced from a continuous web comprising a strip of self adhesive label material on a backing strip, the labels being printed on the label material which is then die cut to create a succession of individual self-adhesive printed labels on the backing strip. When the labels are to incorporate electro-magnetic aerials for anti-theft purposes, the initial web is formed with a continuous metal strip or thread along the full length of the web between the self-adhesive label material and the backing strip. However, this gives rise to problems in the production of the individual labels because it is not easy to cut the metal thread with conventional label

converting equipment. Accordingly, it has been the practice either to punch holes through the web between the labels and on the line of the metal thread, or to use a pre-cutter to cut the thread prior to die cutting the labels, but in each case this introduces an additional step in the conversion of the labels.

Furthermore, with this method the metal thread in each label extends along the full length of the label. This is not only unnecessarily expensive if the length of the label being produced is greater than the minimum length of metal thread needed to form an effective electro-magnetic aerial, but also means that the presence and position of the thread in the label is readily detectable since the ends of the thread will be visible at the end edges of the label.

In addition, the presence of the metal thread in the initial web creates a ridge in the surface of the label material strip which makes it extremely difficult, if not impossible, to print labels with high quality graphics. Accordingly it is often necessary to provide two labels for each item of merchandise to be protected, a primary label carrying the high quality graphics and a secondary label to carry the electro-magnetic aerial.

With a view to overcoming these problems, according to the invention there is provided a method of converting an initial web comprising a strip of self-adhesive label material on a backing

strip into a label web in which the backing strip carries a succession of self-adhesive labels, at least some of which incorporate a length of material which forms an electro-magnetic aerial, the method including the steps of de-laminating and re-laminating the initial web while winding the web from one reel to another, inserting cut lengths of an electro-magnetic aerial forming material between the separated strips of the de-laminated web so that each length of said aerial forming material is sandwiched between the backing strip and the adhesive face of the label material strip when the web is re-laminated, and cutting the label material strip of the re-laminated web to create a succession of labels on the backing strip, the insertion of the lengths of aerial forming material and the cutting of the label material strip being synchronised so that each length of aerial forming material lies wholly within the boundary of a label.

The electro-magnetic aerial forming material may be a metal strip or thread as has been used in the past, or it may be any other suitable material such as a metal coated substrate in the form of a strip or thread made of plastics or some other suitable material having a metallic coating formed by any suitable coating, plating or deposition technique.

As will be appreciated, because individual cut lengths of aerial forming material are inserted into the web, the length of the material may be made the minimum necessary to activate the

security system with which the label is to be used, and provided the label format has a dimension greater than this minimum length, each length of material can be inserted so that it will lie wholly within the perimeter of a label when the label is subsequently cut. This has the advantage that there is no wastage of expensive material, the labels can be cut using conventional label cutting equipment since the aerial forming material does not need to be cut through, and the material is more covertly incorporated into the label since it will not be visible at any edge of the label.

The position of each length of aerial forming material within its label may be further disguised by printing stripes or some other suitable pattern on the adhesive face of the label material strip while the web is de-laminated but before insertion of the lengths of aerial forming material.

Furthermore, the insertion of the lengths of aerial forming material may be controlled so that the lateral position of the material in the re-laminated web, and hence in the cut labels, is varied periodically. This not only further serves to hide the position of the aerials in the labels, but can also serve to ensure that the winding of the label web produces a relatively even reel.

If desired, the insertion of the lengths of aerial forming material may be controlled so that not every label is provided

with an aerial. The percentage of labels which are provided with aerials can be adjusted as desired in order to reduce overall label costs while nevertheless ensuring a reasonable degree of protection for the merchandise to be labelled.

A further major advantage of the method in accordance with the invention is that it can be combined with printing of the labels without the printing being hindered by the presence of the aerial forming material in the labels, thus enabling the printing of high quality graphics if desired. The need for primary and secondary labels is therefore removed, since the method allows the incorporation of the electro-magnetic aerials into the primary labels. The labels will be printed on the non-adhesive face of the label material strip prior to insertion of the lengths of aerial forming material, and preferably prior to de-lamination of the initial web, the printing being synchronised with the subsequent insertion of the aerials and the cutting of the label material strip.

The method may be carried out at or near normal label printing and cutting speeds.

One embodiment of the method in accordance with the invention will now be described, by way of non-limiting example, with reference to the accompanying drawings in which:-

Figure 1 represents diagrammatically one embodiment of the

method; and,

Figure 2 illustrates diagrammatically one example of how the lengths of aerial forming material may be inserted in the embodiment shown in Figure 1.

Figure 1 illustrates a label conversion installation in which an initial web 1, consisting of a strip 2 of self-adhesive label material laminated with a backing strip 3, is drawn or fed continuously from a supply reel (not shown), and the final label web 4 is wound on a take-up reel 5. The self-adhesive label material may be paper having one face coated with a suitable self-adhesive, and the backing strip, which covers the self-adhesive face of the label material, may be a suitable release paper such as silicone coated paper.

The initial web 1 is fed through a printing and drying station 6 in which the labels are printed on the non adhesive face of the strip 2 of label material using any suitable conventional printing technique, such as flexographic, letter-press or silk-screen printing.

Downstream of the printing and drying station 6, the printed web 1 arrives at a de-lamination station 7 which is operative to de-laminate the web so that the separated strips 2 and 3 of the web can be caused temporarily to follow different paths from each other.

Downstream of the de-lamination station 7, the printed label material strip 2 passes through a second printing station 8 at which a pattern, e.g. stripes, is imprinted on the adhesive surface 2a of the strip 2 before the strip passes beneath an aerial cutting and placing unit 9 which is operative to deposit a succession of individual lengths 10 of an aerial forming material, in this embodiment a metal thread such as EAS thread, onto the adhesive surface 2a of the strip 2 as it passes.

Downstream from the cutting and placing unit 9, the strip 2 carrying the succession of individual lengths 10 of metal thread reaches a re-lamination station 11 where it is re-laminated with the backing strip 3 to reform a coherent web in which in the backing strip covers the adhesive face of the label material strip 2 and the lengths 10 of metal thread are firmly pressed into the adhesive layer.

Following the re-lamination station 11 the re-laminated web passes through a conventional label cutting station 12 where the printed label material strip 2 (but not the backing strip 3) is die cut around the printed labels and the waste portion of the strip 2 from around the die cut labels is removed leaving the individual spaced labels 13 on the backing strip 3 to form the final label web 4 which is wound on the take-up reel 5.

The installation also includes a synchronisation unit 14 which is operative to control the printing station 6 and the label

cutting station 12 in relation to each other and to the speed of the web so that the label material strip 2 printed at the printing station 6 is cut at the cutting station 12 in the correct position in relation to the printing. In addition, the synchronisation unit 14 further controls the aerial cutting and placing unit 9 as described below.

Referring now also to Figure 2, the cutting and placing unit 9 comprises at least one supply reel 15 of a continuous metal thread suitable for forming an electro-magnetic aerial, and feed rolls 16 for withdrawing the metal thread 17 from a reel 15 either continuously or intermittently and feeding the thread through a cutting device 18 which is operative intermittently to chop a predetermined length from the leading end of the metal thread 17. Each chopped length 10 of metal thread is collected by a star wheel 19 which is rotated continuously or intermittently to deposit the cut lengths 10 of metal thread at controlled intervals one after the other on the adhesive face 2a of the label material strip 2 as it passes beneath the cutting and placing unit 9.

The synchronisation unit 14 is arranged to control the feed rolls 16, the cutting device 18 and the star wheel 19 of the cutting and placing unit in synchronism with the printing and cutting stations 6 and 12 so that each cut length 10 of metal thread is of the correct length and is deposited by the star wheel 19 correctly on the adhesive face 2a of the label material strip in

relation to the printed labels on the opposite face such that it lies wholly within the boundary of the label 13 which is subsequently cut at the cutting station 12 and therefore does not interfere with the cutter. Generally, the cutting and placing unit will be controlled so that each cut label 13 is provided with an individual length 10 of metal thread on its adhesive face, but if desired the unit may be controlled so that metal threads are inserted in only a predetermined proportion of the labels. Also, the lateral and/or longitudinal position of the cutting and placing unit 9 in relation to the path of the label material strip 2 may be arranged to be adjusted periodically during operation in order to vary the position in which the cut lengths 10 of metal thread are inserted in the labels.

CLAIMS

1. A method of converting an initial web comprising a strip of self-adhesive label material on a backing strip into a label web in which the backing strip carries a succession of self-adhesive labels, at least some of which incorporate a length of material which forms an electro-magnetic aerial, the method including the steps of de-laminating and re-laminating the initial web while winding the web from one reel to another, inserting cut lengths of an electro-magnetic aerial forming material between the separated strips of the de-laminated web so that each length of said aerial forming material is sandwiched between the backing strip and the adhesive face of the label material strip when the web is re-laminated, and cutting the label material strip of the re-laminated web to create a succession of labels on the backing strip, the insertion of the lengths of aerial forming material and the cutting of the label material strip being synchronised so that each length of aerial forming material lies wholly within the boundary of a label.

2. A method according to claim 1, in which the insertion of the lengths of aerial forming material comprises depositing said lengths on the adhesive face of the label material strip before the web is re-laminated.

3. A method according to claim 1 or claim 2, in which the

lengths of aerial forming material are cut to length from a continuous thread or strip of the material which is drawn or fed from a supply reel.

4. A method according to any one of the preceding claims, in which the insertion of the lengths of aerial forming material is controlled so that the lateral position of the material in the re-laminated web, and hence in the cut labels, is varied periodically.

5. A method according to any one of the preceding claims, in which the insertion of the lengths of aerial forming material is controlled so that the longitudinal position of the material in the cut labels is varied periodically.

6. A method according to any one of the preceding claims, in which the insertion of the lengths of aerial forming material is controlled so that not every label is provided with an aerial.

7. A method according to any one of the preceding claims, which includes the step of printing the labels on the non adhesive face of the label material strip prior to insertion of the lengths of aerial forming material, and preferably prior to de-lamination of the initial web, the printing being synchronised with the cutting of the label material strip.

8. A method according to any one of the preceding claims, which

includes the step of printing a pattern on the adhesive face of the label material strip while the web is de-laminated but before insertion of the lengths of aerial forming material.

9. A method according to any one of the preceding claims, in which the aerial forming material is a metal thread or strip.

10. A method according to any one of claims 1 to 8, in which the aerial forming material is a metal coated plastics strip or thread.

11. A method according to claim 1, substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

The Patent Office

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Application No: GB 9615807.6 **Examiner:** Stephen Smith
Claims searched: 1-11 **Date of search:** 4 October 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B8F (FBF); H1Q (QJE, QJH, QKE)

Int Cl (Ed.6): B31D 1/02; H01Q 1/44

Other: ONLINE:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2235176 A (OSAKA) shows delamination and relamination	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.